RESTOCKING CONDITIONS ON THE BURNED-OVER FOREST LANDS OF SOUTHWESTERN MAINE, JUNE 1949

by

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FOREWORD

Disastrous fires swept over some 130,000 acres of forest land in southwestern Maine during the autumn of 1947. Practically all of the timber stand (211 million board feet of saw timber and 400,000 cords of pole timber) was killed or injured by this fire.

Recognizing the need for action programs that would aid in the salvage operations and in rehabilitating the burned-over land, the State of Maine requested the assistance of the Northeastern Forest Experiment Station, U. S. Forest Service, in a series of surveys and studies that would help in deciding what should be done.

The first step in this work, carried out immediately after the fire, involved a field survey of the entire burned area to find out how much fire-killed timber there was. The data thus provided were of considerable value in carrying out the salvage job, which has now been practically completed. About 150 million board feet of sawlog material have been converted into lumber. The pulpwood-size material was inoperable on account of the charred bark.

The next phase included some experimental seeding and planting on the burned-over portion of the Massabesic Experimental Forest. The results obtained by this work indicate that direct seeding by use of aircraft is not, as yet, reliable enough to warrant its use on any extensive scale. The planting experiments show that Pales weevil is now present in the areas where salvage cutting has been carried on. Planting stock set out in such areas has been heavily damaged. This indicates that planting should be deferred until this weevil infestation has subsided--probably within 2 or 3 years after cutting has ceased.

A third group of studies has dealt with the land-ownership situation and with the general economic aspects of the land-rehabilitation problem. The results of these studies have been published in Station Paper No. 19, "Observations on Fire-Damaged White Pine Lands in Southwestern Maine" (August 1948), and in Station Paper No. 23, "Rehabilitation of Fire-Damaged Forest Lands in Southwestern Maine" (February 1949).

The study here reported supplements the two just mentioned. It brings up to date the information on restocking conditions within the burned area, and it presents a more refined estimate of the acreage that cannot be expected to restock without some form of artificial regeneration.

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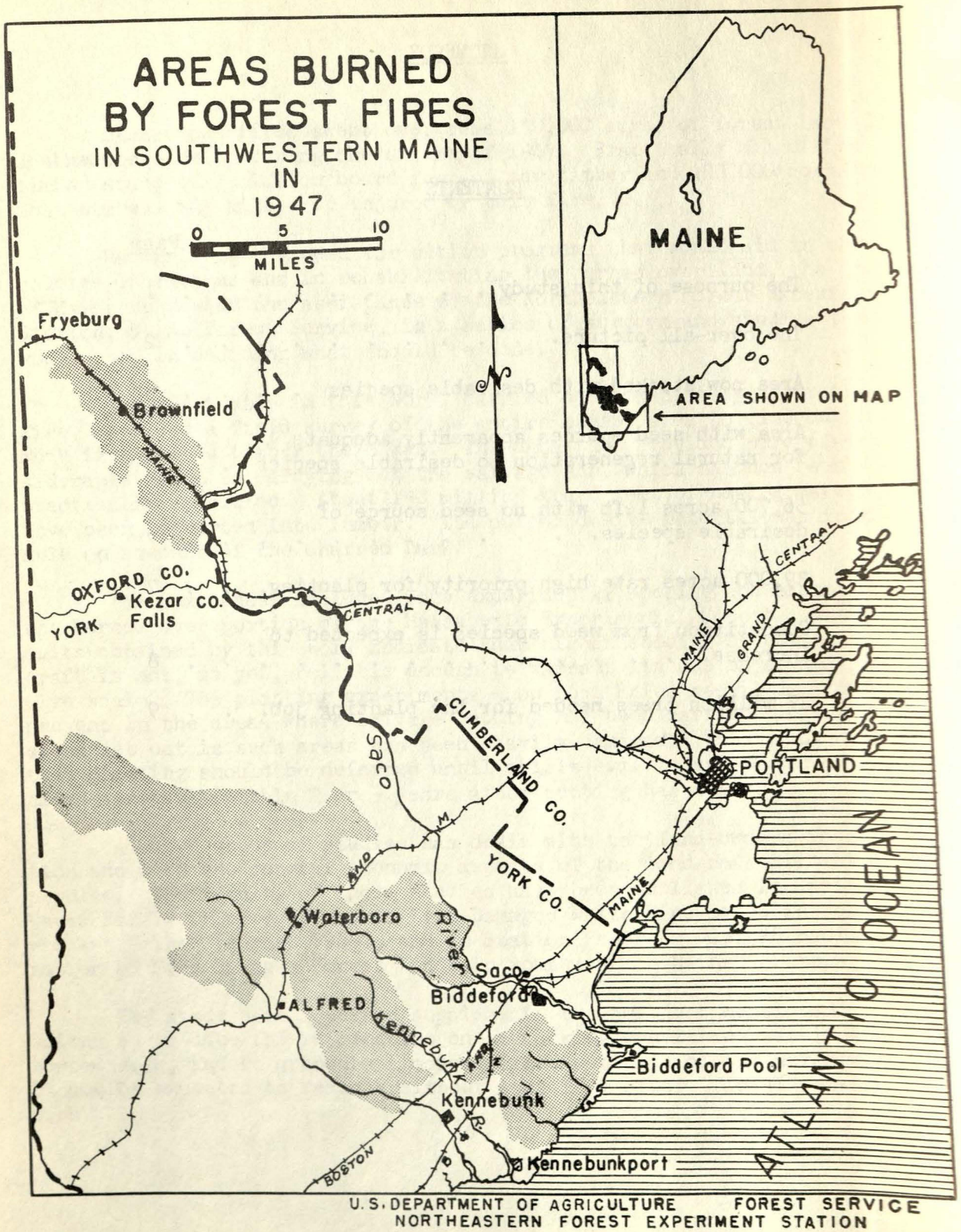

U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE
NORTHEASTERN FOREST EXPERIMENT STATION

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The Purpose Of This Study

The full extent of the damage done by any severe forest fire is not limited to the volume of timber it may consume and kill. Even more important, in most fires, is the extent to which the fire has robbed the land of its natural powers to regenerate a new forest of desirable species.[1]

Damage of this kind cannot be fully determined until at least one growing season has passed. The spring of this year (1949) was obviously the time to make a survey of the entire area burned in southwestern Maine in 1947. The major purpose of the survey was to get some definite measurements of the extent and character of restocking, and to get a more precise estimate of the forest land acreage on which some form of

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[1] Species classed as "desirable" in this particular area include white pine, hemlock, red pine, red and black spruce, balsam fir, yellow birch, sugar maple, white oak, red oak, white and black ash, and beech.

artificial regeneration will be required in order to re-establish a new stand of timber of desirable species within a reasonable time.

The survey procedure involved a careful examination of some 340 sample plots located so as to provide a fair representation of the entire burned-over area. This sampling technique was applied with an intensity calculated to give estimates that fall within a range of error of not more than plus or minus 5 percent.

The Over-All Picture

Of the 130,000 acres of forest land burned over in southwestern Maine, some 44,400 acres (34 percent) appear to be adequately stocked with desirable species (fig. 1). An additional 28,900 acres not yet adequately stocked appear to have sufficient sources of seed. The total acreage that shows reasonable promise for natural regeneration or that has an adequate stand of pole and saw timber left after the fire and salvage operations adds up to 73,300 acres, or 56 percent of the area that was burned over.

The remaining 56,700 acres are lands that have been left without any adequate seed source. This area (44 percent of the total acreage burned over) cannot be expected to regenerate naturally--at least not with desirable species, and not within any reasonable period of time. Further study of this large area that has no adequate seed source indicates that some 34,000 acres are lands on which planting would be practical, and should be given high priority.

Planting of the remaining 22,700 acres would be a low-priority undertaking. They include fairly extensive areas well stocked with red maple and white birch which, because of favorable sites, will probably

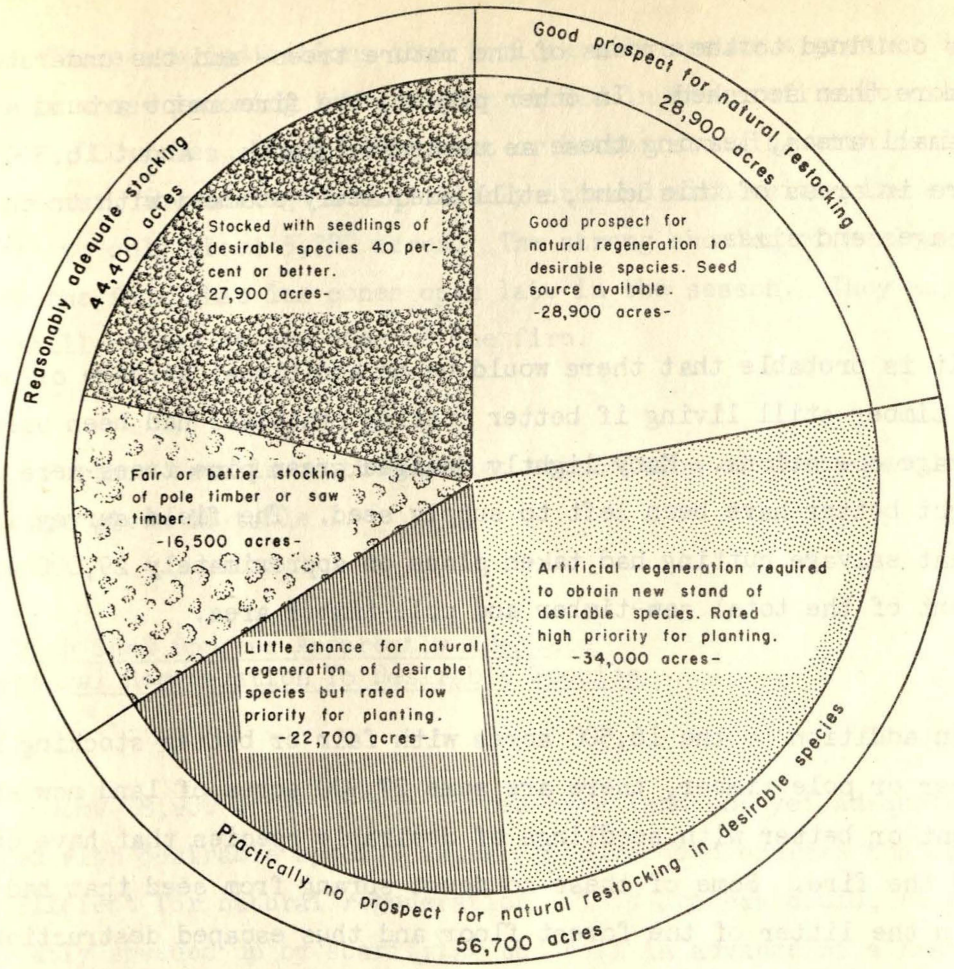
Good prospect for natural restocking
28,900 acres
Reasonably adequate stocking
44,400 acres
Stocked with seedlings of desirable species 40 percent or better.
27,900 acres-
Good prospect for natural regeneration to desirable species. Seed source available.
-28,900 acres-
Fair or better stocking of pole timber or saw timber.
-16,500 acres-
Artificial regeneration required to obtain new stand of desirable species. Rated high priority for planting.
-34,000 acres-
Little chance for natural regeneration of desirable species but rated low priority for planting.
-22,700 acres-
Practically no prospect for natural restocking in desirable species
56,700 acres

Figure 1.--Some 56,700 acres of the land burned over by the forest fires of 1947 do not have an adequate source of seed.

produce a merchantable crop, and should logically be left alone. There are also some wet swamp lands, barren rock outcrops, and heavily brush-covered areas on which planting would be exceedingly costly.

Area Now Stocked With Desirable Species

Although the fire occurred at the end of a long period of drought, when conditions were about as bad as they could possibly be, there was a considerable acreage that was burned rather lightly. In some places the

fire was confined to the crowns of the mature trees--and the understory was no more than scorched. In other places, the fire swept around and beyond small areas, leaving these as unburned islands. About 16,500 acres are in areas of this kind, still adequately stocked with trees of various ages and sizes.

It is probable that there would be an additional acreage of pole and saw timber still living if better cutting practices had been used in the salvage operations. Many lightly damaged green pine trees were cut that might better have been left to supply seed. The field survey indicated that salvage cutting had taken place on approximately 29,000 acres--60 percent of the total saw-timber and pole-timber area.

In addition to the 16,500 acres with fair or better stocking of saw timber or pole timber, there are some 27,900 acres of land now stocked 40 percent or better with seedlings of desirable species that have come up since the fire. Some of these no doubt sprang from seed that had been buried in the litter of the forest floor and thus escaped destruction. The rest must have come from seed that has fallen since the fire. About 85 percent of this seedling acreage has a 40-percent-or-better stocking of softwood species. The other 15 percent is stocked with desirable hardwoods, or with a mixture of desirable hardwoods and desirable softwoods in which the softwoods constitute something less than 40 percent.

It would be wrong to consider the 27,900 acres adequately stocked with seedlings of desirable species as being "in the clear" and needing no further attention. Much of this area, in order for the desirable seedlings to develop properly, will require weeding and other cultural operations from time to time. These operations will be necessary to keep the fast-growing weed hardwoods from overtopping or crowding the more valuable species.

There are indications that hemlock will assume a greater importance in these incoming forests than it did in the prefire forests. About 15,000 acres show a 40-percent-or better stocking with hemlock. In contrast, the acreage now similarly stocked with white pine seedlings amounts to only about 5,700 acres. The strong showing of hemlock may be due to the fact that its cones open late in the season. They may have been still closed at the time of the fire.

Further details on the species composition of these seedling areas are given in table 1.

Area With Seed Sources Apparently Adequate For Natural Regeneration To Desirable Species

Some 28,900 acres of the burned-over land not yet adequately stocked with desirable species appear to have seed sources that should be sufficient for natural regeneration. This process could, no doubt, be greatly speeded up by scarifying the soil in advance of a heavy seed crop. Competition of hardwood weed species such as gray birch and scrub oak will, of course, become an increasing problem. So far, this infestation with weed species is rather moderate.

On about 70 percent of this acreage (20,230 acres) white pine is to be found among the seed trees. On a considerable part of the area it is the only seed-tree species, but elsewhere it is just one of several species that can be expected to supply seed. Hemlock is the principal seed tree species on some 5,780 acres, and it is present in the seed source of an additional 6,070 acres. Red or black spruce and balsam fir appear in the seed source of 580 acres. Pitch pine is found among the seed trees on some 5,775 acres; on 2,300 acres it is the principal seed tree species. The more desirable hardwood species--white oak, sugar maple, and beech--appear among the seed trees on about 3,000

Table 1.--Seedling acreage now stocked 40 percent or better with desirable species

Species[1]	Area with stocking of--				Total	
	40 to 69 percent		70 percent or more			
	Acres	Percent	Acres	Percent	Acres	Percent
White pine	4,520	16.2	1,130	4.1	5,650	20.3
Hemlock	7,120	25.5	7,570	27.1	14,690	52.7
Balsam fir	1,808	6.5	340	1.2	2,148	7.7
Sugar maple	1,808	6.5	--	--	1,808	6.5
White and red oak	340	1.2	--	--	340	1.2
White and black ash	--	--	790	2.8	790	2.8
Beech	340	1.2	--	--	340	1.2
Some combination[2]	2,134	7.6	--	--	2,134	7.6
Total	18,070	64.8	9,830	35.2	27,900	100.0

[1] White birch has not been included in this list of species. Over a large portion of the burned-over area this species does not seem to develop a desirable form. Perhaps in portions of the Oxford County burn white birch would be considered a desirable tree; so the following figures are given for this area. Nowhere in the body of the report, however, has the acreage stocked with white birch seedlings been considered as stocked with desirable species. Some of this acreage is included in the 22,700 acres of low-priority planting. White birch stocking on Brownfield fire area:

Acres	Percent stocked
2,650	40-69
7,250	70+

It is not expected that white birch will develop into a desirable tree on all of this area.

[2] On this acreage no one of the above listed species was sufficient to give 40 percent stocking, but two or more of them in combination did give a stocking that was 40 percent or better.

acres. Usually these species are found with some admixture of the softwoods.

56,700 Acres Left With No Seed Source Of Desirable Species

The remaining 56,700 acres of burned-over land have virtually no prospect of regaining a timber stand of desirable species, within any reasonable time, by natural regeneration. Left to take her course without any assistance from man, nature will gradually reclothe these lands, but not for a long time, and meanwhile they will make little or no contribution to the economy of southwestern Maine.

It would, of course, be foolish to assume that all of this land could be rehabilitated economically by planting. Some of it is swamp. Other parts of it are already so densely covered with weed-hardwood sprout growth that planting stock would be choked out unless expensive brush-control measures were applied. There are fairly extensive areas well adapted to red maple and white birch and on which these species are already established, which should logically be left alone. Then there are other considerable areas where the fire consumed practically all of the thin layer of humus soil, leaving nothing but a thin layer of ashes and burned mineral soil on top of the bedrock. The total acreage of land in these various conditions adds up to about 22,700 acres.

39,000 Acres Rate High Priority For Planting

The remaining 34,000 acres are lands on which planting is feasible and of high priority. This is substantially more than the amount (25,000 acres) previously estimated to be worthy of consideration for planting.

The larger figure, now supported by a resurvey of the entire burned-over area, is the better estimate.

Most of the burned-over area was once in farms. As the land went out of use for crops and pasture, much of it was acquired by persons who were interested primarily in the use of the buildings--either for year-around residences or for summer homes.

Before the fire some 57 percent of the land-ownership units had buildings upon them. About half of these properties lost their buildings in the fire. There are about 250 that have not rebuilt and have no intention of doing so. In such cases, the cleared hay land and pasture that formerly surrounded the old buildings will gradually go back to forest.

This reforestation could be greatly speeded up by planting. Much of this cleared land could be planted more economically than some of the burned-over forest land. There are about 5,000 acres of such open area not classed as forest land, thus making the total area potentially plantable add up to some 39,000 acres.

Competition From Weed Species Is Expected To Increase

Competition by hardwood weed species (gray birch, scrub-oak, and others) was found to be lighter than expected, but still a serious problem to overcome in getting desirable species re-established. About 40 percent of 34,000 acres recommended for planting has 5,000 or more weed hardwood seedlings per acre.

Although no breakdown was made of the areas having fewer than 5,000 seedlings per acre, it is estimated that half of this area would have 2,000 to 5,000 weed seedlings per acre and the other half would have relatively light hardwood competition. It is reasonable to believe that competition from weed hardwoods will increase during the next few years; areas now relatively free of such growth doubtless will be invaded.

It seems obvious that the planting job, if it is to be accomplished at all, should be initiated without undue delay. It may soon be impossible to plant without expensive preplanting site preparation in the form of clearing.

27 Million Trees Needed For The Planting Job

Making allowances for the scattering of seedlings of desirable species that are and will be present on those areas recommended for planting, it is estimated that an average of 700 trees per acre should be planted to give desirable stocking for production of good quality timber.

On this basis it would be necessary to have about 27 million trees to do the full job on 39,000 acres. A nursery production of about 5 million trees per year would be adequate to get the job done in about 6 years. It would, of course, require 3 years to get into full production of 3-0 or 2-1 stock.[2]

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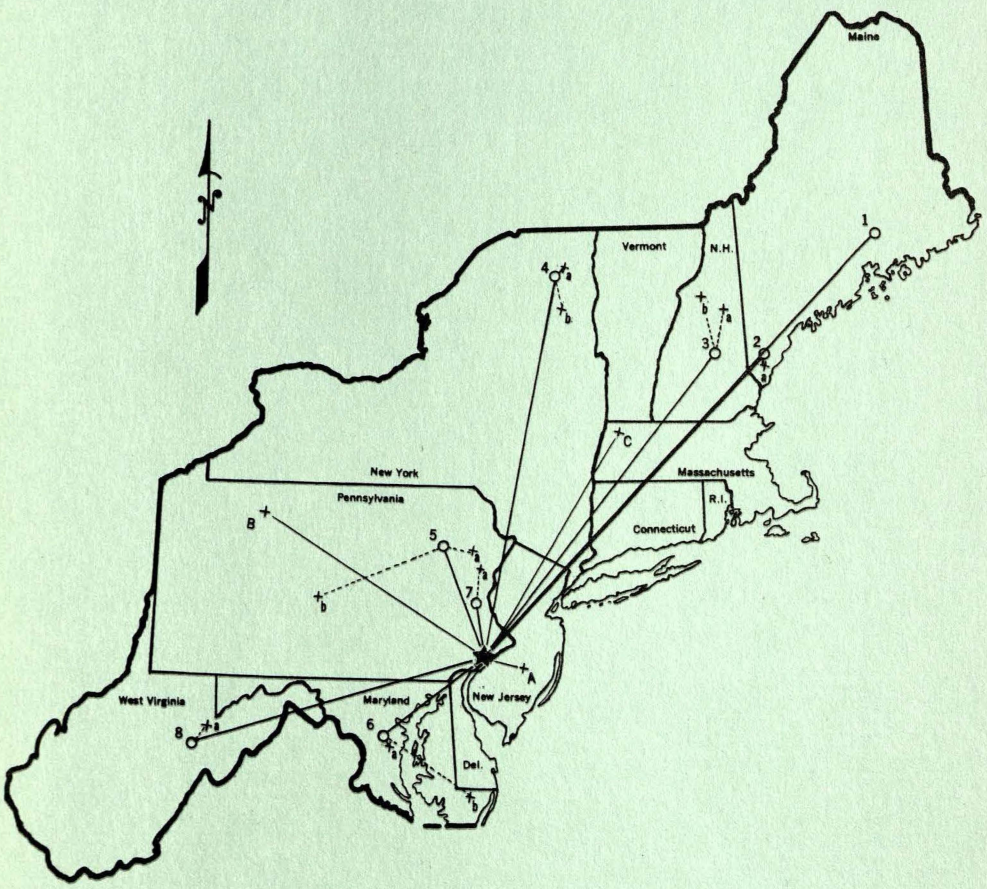
[2] 3-0 refers to 3-year-old seedlings that have not been transplanted. 2-1 refers to trees that have grown in the original seedbed for 2 years and in a transplant bed for 1 year.



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